[redacted] 25X1

22 April 1966
(Corrected copy of [redacted] Ltr. dated 25X1
16 April 1966 for Para. 2 below)

U. S. Government
Washington, D.C.

Attention: Contracting Officer

Subject: Task Order No. 04(100,710)65R
Basic Agreement [redacted]

25X1

Reference: a) Program Meeting of March 1, 1966
25X1 b) [redacted] Ltr. dated 23 March 1966

Enclosure: 1) Spatial Frequency Analyzer Program Clarification
Two (2) Copies

25X1

Gentlemen:

[redacted] submits herewith Enclosure 1) in response to the Government request Reference a) for clarification of several points pertaining to the Spatial Frequency Analyzer on subject Task Order.

Certain EPT equipment, the breadboard high resolution electronic processor, which must be used on Task Order No. 04 (SFA) has been scheduled for very heavy usage on Task Order No. 03 (EPT) until the end of the program. Therefore, it is recommended that if the Task Order No. 04 Spatial Frequency Analyzer Program is to be undertaken, that it be initiated at the completion of the EPT program (Task Order No. 03) technical activity at the end of June 1966.

Should you desire to discuss this matter, please feel free to give us a call.

Very truly yours,

Original Signed by

[redacted] 25X1

Contract Representative

ebj
cc: Technical Representative

Declass Review by NGA.

20 APR 66 998185

MEMORANDUM FOR:

Please route to;

[redacted] 25X

and return to me,

[redacted] 25X

I would appreciate comments.

George

(DATE)

FORM NO. 1 AUG 54 101 REPLACES FORM 10-101 WHICH MAY BE USED. (47)

This could undoubtedly be made to work but the

X1 U.T.F. of the [redacted] system would be so much the limiting factor that I can't see much use for the results. As far as I know, there's no demand for such spatial frequency measurements even if they were available in real time.

D Hobbs

20 APR 66

998185

MEMORANDUM FOR:

Please route to:

[redacted] 25X

I would appreciate comments.

George

(DATE)

FORM NO. 101 REPLACES FORM 10-101
1 AUG 54 WHICH MAY BE USED. (47)

X1 [redacted]

As I recall, all this would be done
X1 for some [redacted] — I don't believe
it! They mention a detailed study
of the system at the onset — I was under
the impression that it was a matter of
hardware implementation — the study, if
I'm correct, will eat up all of the
X1 [redacted] and initiate a beautiful
over-run. I feel they have not satis-
factorily answered our questions —
I pass!

RAS.

25 April 1966

20 APR 66

998185

MEMORANDUM FOR:

Please route to:

[redacted]

25X

I would appreciate comments.

George

(DATE)

FORM NO. 1 AUG 54 101 REPLACES FORM 10-101 WHICH MAY BE USED. (47)

21 Apr 66

C/ISS

X1 [redacted]

Attn:

X1 [redacted]

1. The note indicates they are not anxious, but are still interested in developing the SFA.

2. The note certainly adds very little to our present knowledge of the proposed development. It provides only a few general statements.

3. The concept still looks interesting to me, and I doubt if we will learn as much about it for this little cost under any other circumstances.

X1 4. I await [redacted] recommendations concerning the future of this task.

25X

On 1 Mar 66 we asked [redacted] to

1 March 1966

Describe the:

1. Power Density Spectrum
2. Frequency range (optical)
3. MTF of the analyzer
4. Description of the scan
   a. area or line
   b. dimensions related to frequency
   c. box or TV
5. Compensating circuits for MTF of the Analyzer.
6. Description of display
   a. dimensions
   b. significance
   c. real-time

of the spatial frequency analyzer they planned to build

25X

April 15, 1966

Spatial Frequency Analyzer Program Clarification

References: 1. "Study and Development Program: Image Processing Techniques and Photographic Image Frequency Analyzer," submitted by [redacted] (16 February 1965). 25X

2. "A Proposal for a Study and Experimental Investigation of Electrophotographic Techniques," submitted by [redacted] 25X
X1 [redacted] (24 March 1965).

3. Clarification of [redacted] roposal No. 915908-B, submitted 25X
X1 by [redacted] (20 May 1965).

The following is a further clarification of the above documents as they relate to the spatial frequency analyzer. It should be noted that a really detailed system study comprises the first task scheduled for this proposed program.

The block diagram of the spatial frequency analyzer is given in Reference 1 (p. 16) and in Reference 2 (p. IV-1). The physical setup would utilize the
X1 sensing kinescope [redacted] high-resolution tube) and photomultiplier in the EPT breadboard electronic processing system. The audio frequency analyzer would comprise a Polarad Model 2436 SSB Analysis Module and circuitry developed for the program. The output of the analyzer would be displayed on a standard laboratory oscilloscope and recorded by a standard X-Y recorder ("vertical" contains amplitude data, "horizontal" gives frequency base). The oscilloscope would probably use a 5 inch tube; the recorder would provide the output on graph paper of no more than 12 inches in depth. Both vertical and horizontal scales would be calibrated. Displays would be made in real-time (after the integration which would be performed by the circuitry).

The spatial frequency analyzer would work in either of two modes: MTF or Frequency Spectrum. In the MTF mode, the reduced sensing-kinescope spot would scan a selected sharp edge in the transparency. Total spot deflection would be of the order of 1 mm (referred to the film); noise would be "integrated out" by summing the results of several (uni-directional) scans. The analyzer

output would yield directly a modulation-transfer function for the film-recorded image; frequency range: approximately 0.2-500 cycles/mm.

In the Frequency Spectrum mode, the spot would scan an area, perhaps 25 mm x 25 mm, of the film. Isotropic scan would be employed (using the deflection driver of the EPT breadboard system). The analyzer output, upon being processed externally, would yield a power-density (frequency) spectrum for the area image; frequency range: about 0.02-50 cycles/mm. The actual plot would give, for each frequency in the range, the ratio:

$$\frac{\text{Average number of elements of size } 1/f \text{ in regions of diameter } \Delta f}{\Delta f}$$

In either mode, the analyzing spot (as determined by the kinescope lens) would influence the results. The modulation-transfer function of the spot must, therefore, be determined and compensated for in the final analysis. The extent to which automatic compensation can be made via circuitry would have to be investigated.

April 15, 1966

Spatial Frequency Analyzer Program Clarification

References: 1. "Study and Development Program: Image Processing Techniques and Photographic Image Frequency Analyzer," submitted by [redacted] (16 February 1965).

2. "A Proposal for a Study and Experimental Investigation of Electrophotographic Techniques," submitted by [redacted] 24 March 1965).

3. Clarification of [redacted] Proposal No. 915908-B, submitted [redacted] (20 May 1965).

The following is a further clarification of the above documents as they relate to the spatial frequency analyzer. It should be noted that a really detailed system study comprises the first task scheduled for this proposed program.

The block diagram of the spatial frequency analyzer is given in Reference 1 (p. 16) and in Reference 2 (p. IV-1). The physical setup would utilize the sensing kinescope [redacted] high-resolution tube) and photomultiplier in the EPT breadboard electronic processing system. The audio frequency analyzer would comprise a Polarad Model 2436 SSB Analysis Module and circuitry developed for the program. The output of the analyzer would be displayed on a standard laboratory oscilloscope and recorded by a standard X-Y recorder ("vertical" contains amplitude data, "horizontal" gives frequency base). The oscilloscope would probably use a 5 inch tube; the recorder would provide the output on graph paper of no more than 12 inches in depth. Both vertical and horizontal scales would be calibrated. Displays would be made in real-time (after the integration which would be performed by the circuitry).

The spatial frequency analyzer would work in either of two modes: MTF or Frequency Spectrum. In the MTF mode, the reduced sensing-kinescope spot would scan a selected sharp edge in the transparency. Total spot deflection would be of the order of 1 mm (referred to the film); noise would be "integrated out" by summing the results of several (uni-directional) scans. The analyzer

output would yield directly a modulation-transfer function for the film-recorded image; frequency range: approximately 0.2-500 cycles/mm.

In the Frequency Spectrum mode, the spot would scan an area, perhaps 25 mm x 25 mm, of the film. Isotropic scan would be employed (using the deflection driver of the EPT breadboard system). The analyzer output, upon being processed externally, would yield a power-density (frequency) spectrum for the area image; frequency range: about 0.02-50 cycles/mm. The actual plot would give, for each frequency in the range, the ratio:

$$\frac{\text{Average number of elements of size } 1/f \text{ in regions of diameter } \Delta f}{\Delta f}$$

In either mode, the analyzing spot (as determined by the kinescope lens) would influence the results. The modulation-transfer function of the spot must, therefore, be determined and compensated for in the final analysis. The extent to which automatic compensation can be made via circuitry would have to be investigated.

SECRET
(When Filled In)

SPEED LETTER	REPLY REQUESTED	DATE 18 April 1966
	YES [ ] X NO [ ]	LETTER NO. P&DS/D/SSS/6-25

TO : [redacted] (1)
ATTN:

FROM: [redacted] 25X

Attached is the list of items which we discussed with [redacted] on 1 March 1966 in relation to Contract [redacted] (1) Task 4. At that time, we asked [redacted] to 25X provide us with a description of these characteristics or features of the analyzer and we said we would like to review them before work on the project was started. I don't know why we haven't received an answer, but I think a note from you to them saying "don't start work until we notify you to go ahead" would be in order. It seems unlikely that we would want to cancel, but there is a possibility.

[redacted] 25X

SIGNATURE

REPLY	DATE

SIGNATURE

FORM 5-61 1831

SECRET

25X

On 1 Mar 66 we asked [redacted] to

1 March 1966

Describe the:

1. Power Density Spectrum
2. Frequency range (optical)
3. MTF of the analyzer
4. Description of the scan
   a. area or line
   b. dimensions related to frequency
   c. box or TV
5. Compensating circuits for MTF of the Analyzer.
6. Description of display
   a. dimensions
   b. significance
   c. real-time

of the spatial frequency analyzer they planned to build